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GEOLOGIC QUADRANGLE MAPS

Stonewall Quadrangle
Gillespie and Kendall Counties, Texas

By

VIRGIL E. BARNES

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GEOLOGY OF THE STONEWALL QUADRANGLE, GILLESPIE AND KENDALL COUNTIES, TEXAS

VIRGIL E. BARNES

GENERAL SETTING

Stonewall quadrangle is south of the Llano region and is in the marginal portion of the Edwards Plateau where much of the plateau surface has been destroyed by erosion. Along the southern edge, lobes of the Edwards Plateau are present which southward coalesce to form a continuous narrow east-west plateau belt part of which is just south of the Stonewall quadrangle. Most of the quadrangle is within the gently undulating, broad Pedernales River basin.

The geology of the Stonewall quadrangle is shown on a planimetric map, and the only topographic map available is the reconnaissance 30-minute Fredericksburg quadrangle. Elevations ranging between 1,423 and 1,969 feet were determined during traversing for control, but neither the highest nor the lowest elevation was reached. However, it is estimated that the relief within the quadrangle is about 600 feet, ranging between about 1,400 and 2,000 feet in elevation.

The quadrangle is largely within the Pedernales River drainage basin and is mostly drained by Three Mile Creek and South Grape Creek and its tributary Dry Creek. Cave Creek enters the Pedernales River within the quadrangle and other important branches drain a considerable area in the vicinity of the river. A small area in the southeastern corner of the quadrangle is drained by branches of Blanco River.

The Stonewall quadrangle is high on the southern side of the Llano uplift, and rocks of Cambrian and Ordovician age outcrop in the northern part as inliers surrounded by Cretaceous rocks. The faulting present accompanied the Ouachita orogeny (Barnes, 1948). The Cretaceous rocks are essentially horizontal, dipping eastward about 10 feet per mile.

Broader discussions of the stratigraphic, structural, economic, and geophysical problems of the region cannot be given in the space available. References cited below deal with some of these problems. This publication on the Stonewall quadrangle is one of a series of similar publications, an index to which is shown on the opposite page. The reader is referred to this index map to locate other quadrangles mentioned in the present text.

GEOLOGIC FORMATIONS

PALEOZOIC ROCKS

CAMBRIAN SYSTEM (UPPER CAMBRIAN)

Riley Formation

Cap Mountain limestone member.—The Cap Mountain limestone outcrop in the northwestern portion of the quadrangle is in the continuation of a fault block mapped in the Gold quadrangle in which the Cap Mountain limestone contains much coarse clastic quartz and microcline and occasional granite pebbles. Southward the clastic material lessens, indicating either an increasing distance from the source or a higher stratigraphic level.

Lion Mountain sandstone member.—One Lion Mountain sandstone outcrop 1,200 feet long is mapped in the northwestern part of the quadrangle. The member is poorly exposed and is identified by an occasional iron nodule from the weathering of glauconite and some lenses of cross-bedded trilobite coquina scattered through the soil on a sandy flat. A few limestone beds *in situ* in the lower part of the unit mostly contain corneous brachiopods.

Wilberns Formation

Welge sandstone member.—The Welge sandstone rests upon the Lion Mountain sandstone and does not crop out elsewhere in the quadrangle. The sandstone is brown, nonglauconitic, and many of the quartz grains are secondarily enlarged, producing crystal faces which glitter in the sun.

Morgan Creek limestone member.—The Morgan Creek limestone crops out both in the northwest and northeast portions of the quadrangle. The northwestern outcrop is much the larger and rests on the Welge sandstone described above. The exposure includes all of the beds up to the *Eoorthis* zone and an unknown thickness of the *Billingsella*-bearing beds above. The top of the Morgan Creek is covered by Hensell sand. The lower part of the Morgan Creek as elsewhere in the Llano uplift is of a reddish color, thickly bedded, and highly sandy at the base. Upward the limestone is somewhat thinner bedded, medium to light gray, and where glauconitic, greenish gray. Fossils are trilobites and *Billingsella* in many beds throughout the sequence. A few of the *Billingsella* in the upper part of the sequence are silicified. Fossils collected are brachiopods from localities 5–20A and 5–20B.

The Morgan Creek limestone outcrop about 1 mile downstream from Stonewall is massive and lithologically similar to the Cap Mountain limestone. However, a collection of fossils from locality 2–20A contains, according to Dr. Josiah Bridge, a conaspid zone fauna, identifying the outcrop as Morgan Creek limestone. Another outcrop about 1 mile northeast of Stonewall believed to be the uppermost beds of the Morgan Creek is surrounded by Hensell sand.

Point Peak shale member.—Outcrops of Point Peak shale are numerous northeast of Stonewall, north of Blumenthal, and along Cave Creek. Those in the vicinity of Blumenthal are mostly of stromatolitic limestone in the upper portion of the member. In the area northeast of Stonewall the basal portion of the Point Peak is a shale zone with a limestone bed near the middle containing silicified *Billingsella*. Above this is considerable medium-bedded limestone and dolomite followed by stromatolitic bioherms having inter-areas of bedded limestone and dolomite. The contact with the overlying Pedernales dolomite is irregular, caused by lateral gradation from limestone to dolomite. Shale is actually a minor constituent of the Point Peak shale within the quadrangle. No fossil collections were made from the Point Peak and much of it appears to be relatively unfossiliferous.

Two samples were described by Barnes, Dawson, and Parkinson (1947, pp. 134–135) from the top portion of the unit along the river at Blumenthal. One sample from a bed 20 inches thick is a rather pleasing combination of greenish gray with stylolite lines of dull purple and areas having a faint purplish tint. Fossil fragments are abundant and small cavities are numerous. The rock takes a rather good but somewhat uneven polish. A thin section shows the rock to be about equally dolomite and calcite with a small amount of angular quartz up to 0.1 mm in size. The dolomite is mostly in rhombs about 1/3 mm in size and the calcite in particles from extremely minute to 3 mm in size.

The other sample is from a bed about 2 feet thick and is several feet above the first sample described. It is predominantly brownish red with randomly distributed minute white areas and ivory-colored areas, none of which are more than a quarter of an inch in size. The rock takes a brilliant polish. In thin section the rock is seen to be about one-third calcite and two-thirds dolomite containing a small amount of angular quartz mostly less than 1/15 mm in size. The calcite is mostly in grains between 1 and 3 mm in size and the dolomite averages about 1/3 mm in size.

Pedernales dolomite member.—Outcrops of Pedernales dolomite are widely scattered along the northern edge of the quadrangle. They are most plentiful east of Stonewall where coarse-grained and fine-grained facies have been mapped separately. Fine-grained dolomite is in contact with the underlying Point Peak shale except in the vicinity of Blumenthal where coarse-grained dolomite is resting directly on stromatolites of the Point Peak shale. About 1.5 miles east of Stonewall along a north branch of Pedernales River a small area of the upper fine-grained dolomite of the Pedernales appears to be collapsed, being partly in contact with coarse-grained dolomite and partly in contact with San Saba limestone. Many of the Pedernales dolomite outcrops are isolated and have been identified by lithology, relative position with reference to identified outcrops, and in some outcrops by fossils.

A sample of a brecciated dolomite composed of brownish fragments in a groundmass of fritted material deep reddish brown in color was collected by Barnes, Dawson, and Parkinson (1947, p. 153). The dolomite is porous and takes a rather poor polish. In thin section dolomite grains up to 2 mm are present, and the section contains some angular quartz in grains up to 1/15 mm in size. Fossils are not plentiful in the Pedernales dolomite, and the only collections made are trilobites and brachiopods from localities 3–8A and 6–13A.

San Saba limestone member.—In the southwestern part of the Llano uplift outcrops of the San Saba limestone are not abundant; however, several outcrops are present in the Stonewall quadrangle. The San Saba limestone grades laterally into coarse-grained Pedernales dolomite and is therefore a calcitic facies of the dolomite. The San Saba limestone outcrops are situated in the northeastern part of the quadrangle. They are unfossiliferous and are very similar in appearance to the limestone in the Threadgill member of the Tanyard formation.

ORDOVICIAN SYSTEM (LOWER ORDOVICIAN–ELLENBURGER GROUP)

Tanyard Formation

Staendebach member.—Most of the outcrops of the Staendebach member are in the northwestern portion of the quadrangle and a few are in the north-central portion. Only the mostly cherty, fine-grained upper portion of the member appears to be present. The dolomite coarsens a little toward the Gorman contact. Fossils collected from locality 6–1B north of the Cemeterio de Nuestra Señora de Guadalupe have been identified by Dr. Josiah Bridge as belonging to the *Symphysurina* zone. Fossils noted, but not collected, in the next two outcrops to the west are *Lytospira* and *Ophileta*.

Gorman Formation

Dolomitic facies.—Two outcrops of the dolomitic facies of the Gorman formation occupy a synclinal area in the northwestern portion of the quadrangle. Cretaceous overlap masks some of the details but the surrounding outcrops of the Staendebach in the Stonewall quadrangle and the Gold quadrangle to the north show that the Gorman must be limited in extent and probably forms a basin elongated in a northeast-southwest direction. The Gorman is composed of microgranular dolomite, and to the northwest on the Gold quadrangle sand is present in the dolomite. No fossils were found.

MESOZOIC ROCKS

CRETACEOUS SYSTEM (LOWER CRETACEOUS)

Shingle Hills Formation

Hensell sand member (Barnes, 1948).—The Cretaceous rocks dip eastward in the Stonewall quadrangle about 10 feet per mile. Taking the dip into account it is estimated that the Hensell sand outcrop ranges between about 100 and 130 feet in thickness between Pedernales River and the base of the Glen Rose limestone. Additional beds are present in the subsurface.

The Hensell sand in the vicinity of Pedernales River rests on all units of the Cambrian except the Hickory sandstone and on units of the Ordovician including the Staendebach member of the Tanyard formation and the dolomitic facies of the Gorman formation. It is likely that other units of the Ordovician are overlapped in the subsurface. The Hensell varies widely in color and composition, is in general very poorly sorted, and ranges from coarse material such as conglomerate through the various sand sizes to silt and clay. Outcrops of conglomerate, Kshh(c), are well indurated basal conglomerate outcropping mostly in proximity to Paleozoic rock outcrops. The outcrops of the conglomerate within Stonewall quadrangle are small and mostly situated in the vicinity of Stonewall and Blumenthal with one isolated outcrop on South Grape Creek. Conglomerate present elsewhere in the Hensell is not indurated and is not mapped separately. One of these conglomerates in a highway cut about one-quarter mile east of South Grape Creek is composed mostly of Cambrian limestone, Ordovician (?) chert, and granite and underlies a coarse-grained gray sandstone.

Angular quartz granules and solution-sculptured microcline are common in the lower part of the Hensell especially in the vicinity of Pedernales River. The upper portion of the Hensell sand is finer grained and contains abundant silt and clay, and in the vicinity of the base of the Glen Rose some of the beds are calcareous.

The Hensell sand in Gillespie County is composed predominantly of two color facies, a lower one predominantly red and an upper one predominantly gray. The dividing line between these facies roughly parallels the base of the Glen Rose limestone and therefore rises stratigraphically toward the Llano uplift, being controlled in part by the proximity of the ancient shore. A third facies is present in the Stonewall quadrangle in the basal portion of the Hensell in which the beds are mostly yellowish gray to greenish gray. The red middle facies wedges out eastward.

The Hensell is so slightly indurated that it readily breaks down and forms gentle slopes except immediately beneath the Glen Rose limestone. The more siliceous and coarser grained lower portions support a growth of broad-leaf oak which on aerial photographs shows as a featureless expanse of woodland. Much of the woodland has been cleared and the land is now under cultivation. The Hensell sand along with the Glen Rose limestone shares the greatest density of population within the quadrangle.

Since the Hensell sand is so slightly indurated, exposed sections normally are not more than a few feet thick. In the Stonewall quadrangle, however, one section on Three Mile Creek, about 40 feet thick, is fairly well exposed; and another on South Grape Creek, 68 feet thick, is excellently exposed. Fossils in the Hensell sand are not common but some are present in both sections. Fossils collected from the Hensell and identified by Dr. Ralph Imlay are as follows:

Locality 3–15A, about 1 mile southeast of Stonewall—
Ostrea sp.
Nerinea sp.
Locality 6–1A, along Threemile Creek about 1.8 miles southwest of Stonewall—
Panope? cf. knowltoni (Hill)
Cucullaea sp.
Pecten (Chlamys) stantoni Hill
Cassiope branneri (Hill)

Glen Rose limestone member.—The thickness of the Glen Rose is estimated to be about 270 feet along the Blanco road southeast of Luckenbach. Additional beds are present in the subsurface in the southern part of the quadrangle caused by lateral gradation of clastic sediments of the Hensell to carbonate beds of the Glen Rose away from the Llano uplift.

The contact between the Glen Rose limestone and the Hensell sand is arbitrarily placed at the bottom of the lowest bench-forming bed, be it limestone, dolomite, or calcareous sandstone. In following the contact, as bench-forming beds come or go, the contact is lowered or raised to the base of the next bench-forming bed. In mapping, however, it is almost impossible to decide at which point the bench-forming bed ceases to exist, so the basal boundary of the Glen Rose is not mapped as a series of steps but is gradually rounded off from the base of one to the base of the next. Most of the contact between observed points was traced on aerial photographs with the aid of a stereoscope, and since the terrace of any one bed gradually merges with the general slope as it dies out it is easy to raise or lower the contact to the next one.

The Glen Rose limestone consists of alternating beds of limestone, clay, and sand or, more correctly stated, beds having various proportions of these materials. Along South Grape Creek 77 feet of Glen Rose beds were measured. These beds are similar to those in the rest of the Glen Rose sequence except that in the lower part they are somewhat more highly fossiliferous.

Fossils collected from the Glen Rose limestone and identified by Dr. Ralph Imlay are as follows:

Locality 6–15A, about 1.7 miles airline southeast of Luckenbach—
Homomya jurafacies Cragin
Panope? knowltoni (Hill)
Tapes sp.
Serpula paluxiensis Hill
Enallaster cf. texanus (Roemer)
Porocystis globularis (Giebel)
Gryphaea mucronata Gabb
Cuspidaria sp.
Astarte sp.
Anomia sp.
Aporrhais? sp.
Cucullaea sp.
Arctica medialis (Conrad)
Trigonia sp.
Protocardia sp.
Cyprimeria sp.
Pecten (Chlamys) stantoni Hill
Cardium? sp.
Gryphaea wardi Hill and Vaughan
Lunatia? praegrandis (Roemer)
Lunatia? sp.
Pseudonerinea? sp.
Tylostoma cf. regina (Cragin)
Trapezium? sp.
Panope sp.
Locality 6–17A, about 3 miles airline south-southeast of Luckenbach and from near the top of the Glen Rose limestone—
Anatina sp.
Nerinea sp.

Fredericksburg Group

The Fredericksburg group in the Stonewall quadrangle consists of about 180 feet of Edwards limestone, about 28 feet of Comanche Peak limestone, and about 15 feet of Walnut clay. The boundaries of the units are gradational, and so far as this quadrangle is concerned, Thompson's (1935) observation that these units should have about the rank of members seems logical. However, instead of introducing a new name, Fredericksburg could easily be dropped from group to formational rank, especially since the U. S. Geological Survey excludes the Kiamichi clay from the Fredericksburg group (Wilmarth, 1938, p. 776).

Walnut clay.—A thickness of 15 feet of Walnut clay was measured along the Luckenbach-Blanco road, and this is perhaps a little thicker than its average within the Stonewall quadrangle. Along the Luckenbach-Blanco road the Walnut clay rests on a poorly exposed limestone having a rusty upper surface, and similar limestone is present in the quadrangles to the west and north. A piece of limestone seen in the vicinity is full of *Lithodomus?* borings and may be from the surface of the same bed. Farther east in Blanco County the top limestone of the Glen Rose is commonly bored.

The Walnut clay grades upward into the Comanche Peak limestone, and the contact is placed at the point that the calcareous content becomes sufficiently high to cause the rock to have some resistance to weathering. Within the Stonewall quadrangle the Walnut bench becomes wide enough to map, and the Walnut is shown on the map by a solid color line only in the western third of the quadrangle. The Walnut clay forms a bench which is typically barren of trees but which is still not wide enough to influence noticeably the culture of the area.

Most of the fossil collections made from the Walnut clay also contain fossils from the basal portion of the overlying Comanche Peak limestone, since the fossils from both units weather free and intermingle. Fossils collected from the Walnut clay and identified by Dr. Ralph Imlay are as follows:

Locality 3–12A, about 6.4 miles airline south-southeast of Stonewall—
Lunatia? praegrandis (Roemer)
Lunatia? sp.
Tylostoma sp.
Tylostoma cf. regina (Cragin)
Aporrhais? cf. subfusiformis (Shumard)
Nerinea cf. incisa Giebel
Turritella sp.
Lunatia? pedernalis (Roemer)
Trapezium texana (Roemer)
Linearia? irradians (Roemer)
Tapes cf. guadalupe Böse
Tapes cf. aldamense (Böse)
Protocardia sp.
Tapes cf. whitei Böse
Pholadomya sancti-sabae (Roemer)
Cyprimeria texana (Roemer)
Mactra? sp.
Trigonia sp.
Cucullaea sp.
Arctica sp.
Pecten (Neithea) occidentalis (Conrad)
Isocardia sp.
Metengonoceras sp.
Metengonoceras cf. ambiguum Hyatt
Exogyra texana Roemer
Exogyra texana var. weatherfordensis Cragin
Gryphaea mucronata Gabb
Enallaster texanus (Roemer)
Holectypus planatus Roemer
Locality 3–17A, about 4.3 miles airline south by a little east of Stonewall—
Cardium sp.
Pholadomya sancti-sabae (Roemer)
Brachydontes pedernalis (Roemer)
Holectypus cf. planatus Roemer
Locality 6–4A, about 5 miles airline south by a little west of Stonewall—
Trigonia sp.
Exogyra texana Roemer
Gryphaea mucronata Gabb
Enallaster texanus (Roemer)
Locality 6–5A, about 4.3 miles airline southeast of Luckenbach—
Gryphaea mucronata Gabb
Ostrea (Lopha) sp.
Holectypus planatus Roemer
Locality 6–5B, about 4.5 miles airline southeast of Luckenbach—
Caprinula crassifibra (Roemer)
Enallaster cf. obliquatus Clark
Locality 6–5C, about 4.5 miles airline southeast of Luckenbach—
Tylostoma cf. regina (Cragin)
Aporrhais? subfusiformis (Shumard)
Nerinea cf. incisa Giebel
Aporrhais? sp.
Protocardia multistriata Shumard
Tylostoma cf. whitei Böse
Tapes cf. guadalupe Böse
Tapes cf. aldamense Böse
Pholadomya sancti-sabae (Roemer)
Cyprimeria texana (Roemer)
Trigonia sp.
Isocardia sp.
Modiola concentrice-costellata Roemer
Brachydontes pedernalis (Roemer)
Exogyra texana Roemer
Gryphaea mucronata Gabb
Enallaster texanus (Roemer)
Trochotiara texana (Roemer)
Holectypus planatus Roemer
Holectypus engerrandi Lambert
Locality 6–10A, about 3.5 miles southeast of Luckenbach—
Caprinula crassifibra (Roemer)

Comanche Peak limestone.—The thickness of the Comanche Peak limestone was not measured within the Stonewall quadrangle. A short distance to the south of the quadrangle along the Blanco road a thickness of 43 feet was determined for the combined Walnut and Comanche Peak. Since the thickness of the Walnut near by within the quadrangle is 15 feet, the thickness of the Comanche Peak limestone here is about 28 feet. Near Cain City in the adjacent quadrangle to the west its thickness is 29 feet. The thickness of the Comanche Peak within the quadrangle is probably, therefore, near 28 feet.

The Comanche Peak limestone grades downward into the Walnut clay and upward into the Edwards limestone. The upper boundary is arbitrarily placed at the base of the first chert-bearing limestone. The Comanche Peak limestone contains considerable argillaceous material especially in its basal portion. Some of the Comanche Peak limestone has been extensively burrowed and the lower part is nodular. The top portion is well bedded but being soft is infrequently exposed.

The Comanche Peak limestone is softer than the overlying Edwards limestone and has eroded into a steep slope which is characteristic of its outcrop throughout the quadrangle. On aerial photographs the Comanche Peak limestone on north slopes is characterized by a distinctive black band, caused by a thick growth of vegetation dominated by a narrow-leaf oak, "*Quercus texana* Sargent (Texas oak)," listed by Cuyler (1931) as being the dominant tree on the Walnut and Comanche Peak.

In mapping the Comanche Peak limestone, points at which its boundaries cross roads were placed on aerial photographs. Additional points of contact were mapped at many places between roads and on all outliers. On portions of the photographs having stereoscopic coverage the boundaries were traced under the stereoscope, and where stereoscopic coverage was lacking the boundaries could still be very closely approximated by following the vegetational banding.

No section of the Comanche Peak limestone within the quadrangle is described; however, sections which are probably similar have been measured in the Cain City quadrangle to the west and the Albert quadrangle to the east. In the eastern part of the quadrangle and first noted along the Luckenbach-Blanco road is a layer of caprinulids which in the section measured in the Albert quadrangle is 5 feet thick.

The Comanche Peak limestone is fossiliferous especially in its basal portion, and indications of fossils are abundant throughout much of the rest of it. Collections were not made from the Comanche Peak limestone, but, as explained above, some fossils from it probably are included with the Walnut clay collections.

Edwards limestone.—The Edwards limestone is about 160 feet thick along the Luckenbach-Blanco road, and perhaps as much as 20 feet additional Edwards is present along the ridge to the north. The base of the Edwards is placed at the base of the lowest limestone which contains chert. The Edwards limestone in the Stonewall quadrangle is composed of a variety of rock types including limestone, dolomite, and chert. The limestone and dolomite vary widely in composition, texture, thickness of beds and hardness, and the expression of the variation is very well shown on aerial photographs by vegetational banding. The outcrop of the Edwards has an average density of vegetation greater than that of the Glen Rose limestone, and in addition the vegetation shows better segregation into bands. Above the abrupt slope of the Comanche Peak limestone, the Edwards limestone flattens out into gently sloping surfaces. The hard limestone beds weather slowly and have only a thin soil covering or are bare and nearly void of vegetation. The softer beds develop a more adequate soil and are thickly vegetated mostly by a scrub oak locally known as "shinnery." Cuyler (1931) identifies it as "*Quercus fusiformis* Sargent (mountain scrub oak)." In areas that are highly cherty the broad-leaf oak is common.

The Edwards surface is mostly rocky and above some beds is chert-strewn. Some of the chert in the Edwards limestone is of a quality suitable for the manufacture of artifacts, and because it was used extensively by the aborigines is mostly referred to as flint. Only the harder beds in the Edwards are exposed, and this in conjunction with the gentle slopes makes the measuring of sections difficult.

No fossil collections were made from the Edwards within the Stonewall quadrangle; however, some fossiliferous chert was seen near the divide on the Luckenbach-Blanco road.

QUATERNARY DEPOSITS

High gravel.—Most of the high gravel deposits within the quadrangle are probably stream deposited, but much of the material may be reworked from colluvial deposits which at one time probably covered much of the outcrop area of the Hensell sand. The high gravel is composed chiefly of pebbles, cobbles, and finer materials including caliche. Much of the material is limestone, chert, and dolomite from the Edwards, limestone from the Comanche Peak, reworked siliceous materials from the Hensell sand, and an occasional pebble derived directly from outcropping Paleozoic rock. The high gravel supports a clumpy vegetation, live oak mottes being common.

Alluvium.—Deposits of alluvium are mostly situated along Pedernales River and South Grape and Three Mile Creeks. Narrow belts and patches of alluvium follow many of the lesser drainages in the area but are insignificant and have not been mapped. The alluvium is composed of sand and silt at the surface and of coarser materials beneath. Some of the alluvium is cultivated, and some supports a growth of pecan trees.

SUBSURFACE GEOLOGY

Cambrian and Ordovician rocks are exposed along Pedernales River in the northern part of the quadrangle, and these rocks continue southward beneath the Cretaceous. No well data were obtained within the quadrangle, but it is unlikely that rocks younger than Ordovician or older than Cambrian are present beneath the Cretaceous. The outcropping Paleozoic rocks are faulted, and their pattern beneath the Cretaceous probably is equally complicated.

The information about the pre-Cambrian rocks upon which the Paleozoic rocks lie is limited to some gravity data. An east-west-trending gravity ridge, reaching a maximum on the Cain City quadrangle to the west, dominates the gravity picture within the quadrangle. The values of gravity within the quadrangle are considerably higher than in quadrangles to the north. Large gravity maxima in the area of outcropping pre-Cambrian rocks of the Llano uplift are associated with Packsaddle schist (Romberg and Barnes, 1944, and subsequent unpublished data). Basic intrusive rocks could, however, account for at least a portion of the anomalous mass.

MINERAL RESOURCES

The mineral resources of the quadrangle are limited to nonmetallic substances and water. Outside of the soils the most important nonmetallic resources are construction materials.

CONSTRUCTION MATERIALS

Building stone.—The rocks of Paleozoic age outcropping within the quadrangle are mostly low lying along Pedernales River, and where not along the river the outcrops are in flat areas unsuited to the establishment of quarries. Barnes, Dawson, and Parkinson (1947, pp. 134–135 and 153–154) have described some of the rocks in the vicinity of Blumenthal. Two samples were collected, one from a massive stromatolitic limestone and another from a somewhat dolomitic inter-bed. The rock takes a fair to brilliant polish depending on the amount of dolomite present, but the deposit is subject to overflow, making it unsuited as a quarry site. A sample was collected from a coarse-grained dolomite overlying the stromatolitic limestone. The rock is not especially pleasing in color and is mostly suited for producing crushed stone. This deposit also is along Pedernales River and subject to overflow.

Deposits of San Saba limestone with massive appearance are situated in the northeastern portion of the quadrangle. The stone is light colored and attractive, but coring would be necessary to determine if the stone is massive enough for the production of saw-blocks.

Limestone beds within the Edwards limestone, at the top of the Comanche Peak limestone, and perhaps within the Glen Rose limestone are of about the proper thickness for ledge-stone for building. Some of the limestone beds in the Edwards are of a pleasing light color, but most of the limestone in the Comanche Peak is yellowish gray and somewhat drab.

Road material.—Some of the secondary roads within the quadrangle have been surfaced by calcareous materials from the Glen Rose limestone, caliche from colluvial deposits, and calcareous shale from the Point Peak shale. The material produced from one pit marginal to an outcrop of the Staendebach member of the Tanyard formation consists mostly of porous chert derived from the Staendebach. The calcareous materials used are in part satisfactory for surfacing secondary roads but are of little value for base-course material in highway construction since they cause freeze damage. Better materials for highway construction are available from some levels in the Edwards limestone and from some of the units in the Paleozoic. Much of the outcropping Paleozoic rock is hard enough for the production of granules.

Sand and gravel.—Sand and gravel deposits within the quadrangle are situated along Pedernales River between Blumenthal and Stonewall. Elsewhere along the river the gradient is too steep for the accumulation of significant deposits. Local beds within the Hensell may contain sand suitable for building without beneficiation, but most of the sand beds contain argillaceous material that should be removed by washing. The high gravel deposits are mostly too poorly sorted and contain too much caliche to be used without first being screened and washed. Some of the Paleozoic rocks and some zones within the Edwards limestone are suitable for the production of crushed rock.

WATER

A ground-water survey of Gillespie County was made by Shield (1937). Of the 10 wells inventoried in the Stonewall quadrangle, 8 are probably in the Hensell sand outcrop area, and the other 2 are probably in the Glen Rose outcrop area; however, these wells probably penetrate to the Hensell sand. Some of the wells penetrate the Hensell and enter rocks of Paleozoic age. One such in the vicinity of Blumenthal reported to be obtaining water from limestone may be obtaining water from near the horizon of the Welge and Lion Mountain sandstones.

The wells range from 38 to 325 feet in depth, and in 1936 the water level ranged from 25 to 178 feet below the surface. The total solids range between 366 and 2,343 parts per million with half of the wells above a thousand parts per million. The main easily available source of ground water in the area is the Hensell sand.

In much of the area in the vicinity of the Pedernales River the depth to the sandstones of the Cambrian should not be excessive. Where Pedernales dolomite is exposed, for example, the depth to the Welge and Lion Mountain sandstones should range from about 300 to 550 feet. Depths to these sands in the Point Peak shale and Morgan Creek limestone outcrops will be less. The quality of these sands as an aquifer is unknown, but the Welge at least should contain some water. The Hickory sandstone will be about 500 feet deeper than the Lion Mountain sandstone, and since granite knobs are known to reach as high as the Cap Mountain limestone in the quadrangle to the north it is possible that the Hickory will be missing in some areas. The Hickory sandstone is an aquifer at many places in central Texas and from its character in an outcrop in the Gold quadrangle to the north should be water bearing in this part of the Llano uplift.

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STRATIGRAPHIC SECTION

Section Along South Grape Creek, 2.25 Miles South-Southwest of Blumenthal

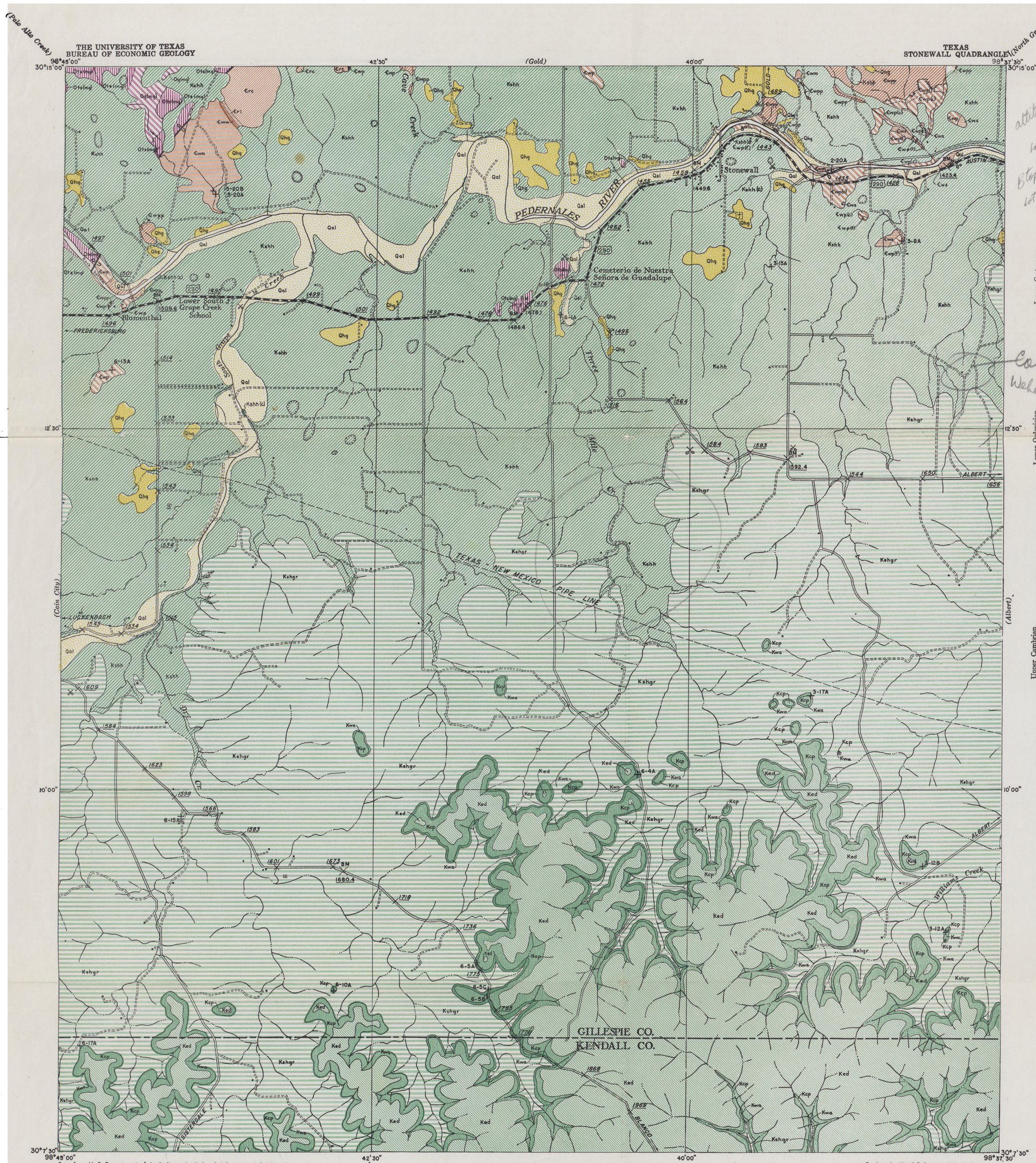
Description	Thickness in feet: Interval	Thickness in feet: Cumulative	Feet above base
Shingle Hills formation: 145 feet measured			
Glen Rose limestone member: 77 feet measured			
1. Limestone—coarse grained, one bed, grayish orange, resistant, very hard, and composed of ground-up oyster shell. This bed essentially forms the top of a heavily vegetated hill.	1	1	144 –145
2. Clay—poorly exposed.	17	18	127 –144
3. Limestone—coarse grained aggregate of fossil fragments, hard, slightly sandy, yellowish gray, and produces a flat which is one of the major benches in the line of section.	0.5	18.5	126.5–127
4. Clay—poorly exposed.	0.5	19	126 –126.5
5. Limestone—silty, argillaceous, nodular, forms a small bench, and is burrowed.	2	21	124 –126
6. Clay—poorly exposed.	2	23	122 –124
7. Limestone—silty, argillaceous, nodular, forms a small bench, and is burrowed. The upper surface contains *Lithodomus?* borings.	2	25	120 –122
8. Clay—poorly exposed.	4	29	116 –120
9. Limestone—silty, argillaceous, nodular, forms a small bench, and is burrowed with burrows weathering out to produce a honeycombed rock.	1	30	115 –116
10. Clay—poorly exposed, except for a platy limestone weathering out at about 109 feet which is about 2 inches thick. The limestone contains fossils, weathering out on top surface, consisting mostly of gastropods up to 2.5 inches long and only 0.1 inch in diameter at the base. Casts of pelecypods and gastropods weathered out on flat at foot of interval may be from within interval.	11	41	104 –115
11. Limestone—silty, argillaceous, nodular, contains some casts of fossils, and forms a bench.	4	45	100 –104
12. Clay—poorly exposed.	2	47	98 –100
13. Limestone—argillaceous, silty, nodular, fossiliferous and forms a bench. Fossils are pelecypod and gastropod casts and *Porocystis* throughout most of interval with an inch thick platy limestone bed at base covered by several genera of small pelecypods which weather in relief on the surface.	3	50	95 – 98
14. Clay—poorly exposed.	2	52	93 – 95
15. Limestone—argillaceous, nodular, fossil casts common, and forms a bench.	3	55	90 – 93
16. Clay—highly calcareous, silty, and contains abundant pelecypod and gastropod casts, a few oysters, worm tubes, and *Porocystis*.	5	60	85 – 90
17. Limestone—sandy in lower portion, silty, argillaceous, and nodular. In lower part highly burrowed with the burrows being yellowish gray and the matrix yellowish orange. In upper part a few recessive zones are somewhat more argillaceous than the interval as a whole. Pelecypod casts are very abundant, gastropod casts are common, and in the upper part of interval *Porocystis* up to 1 inch in diameter are present. The limestone in this interval forms a distinct bench which can be traced for a long distance.	17	77	68 – 85
Hensell sand member: 68 feet measured			
18. Sand—coarse to fine grained and contains a few thin pebbly bands. The bottom foot is cemented by calcium carbonate. A bed from 61.5 to 62 feet is somewhat cross-bedded, indurated, contains casts and molds of pelecypods and gastropods, and shows some evidence of burrows. Microcline is present but is in smaller pieces and is less abundant than lower in section. The sand grains are angular to subrounded and a few are well rounded.	14	91	54 – 68
19. Clay—highly sandy and weathered yellowish gray.	1	92	53 – 54
20. Sandstone—medium grained, argillaceous, resistant, and the poorly sorted angular grains are cemented by calcium carbonate.	1	93	52 – 53
21. Clay—silty, weathered to yellowish orange, and with oysters in clumps at the base of the interval.	1	94	51 – 52
22. Sand—medium grained, some coarse and fine grained lenses, highly argillaceous, cross-bedded, and contains pebbles up to an inch in diameter of locally derived, slightly finer grained, argillaceous sediments. The grains are angular and are mostly quartz and some microcline.	16	110	35 – 51
23. Sand—mostly very coarse grained, some fine to medium grained lenses, highly argillaceous, highly cross-bedded, very poorly sorted, and contains a few pebbles in some beds up to an inch in size. Microcline fragments a quarter inch in size are common. Some lenses are near clay in composition and are of a grayish green color—a few balls of this material are contorted and are present in the very coarse grained sand. Masses of the finer grained contemporaneous sediments are also present in the very coarse grained sand. White specks of kaolin? present are probably weathered plagioclase feldspar. The sand grains are mostly angular.	11	121	24 – 35
24. Sand—mostly fine to medium grained, highly argillaceous, and pale olive with some of the rock having a pinkish cast. The sand grains are angular and are mostly quartz, some microcline, and a very small amount of mica. Caliche has formed stalactitic to horizontal irregular masses on the surface of the outcrop throughout the interval.	9	130	15 – 24
25. Sand—very coarse grained, in part conglomeratic, highly argillaceous, cross-bedded, and poorly sorted. The sand grains are rough, mostly angular, and consist mostly of quartz, considerable microcline, and small kaolin? specks that probably originally were plagioclase feldspar. The pebbles are 1 to 2 inches in diameter, and those consisting of quartz and quartzite are well rounded, and other irregular pebbles are composed of calcium carbonate and sand and have the appearance of caliche. Microcline fragments up to ¾ inch in length are common.	12	142	3 – 15
26. Clay—highly sandy, grayish green, and with caliche stalactites forming on face of outcrop and with caliche capping the interval as if the clay were serving as a base for the deposition of calcium carbonate.	3	145	0 – 3

The amount of insoluble residue, after hydrochloric acid treatment, for a portion of the section is as follows:

Feet above base	Percent residue
0– 5	44.7
5–10	78.7
10–15	86.7
15–20	73.2
20–25	94.2
25–30	95.5
30–35	90.5
35–40	94.8
40–45	92.9
45–51	99.2
51–56	58.7
56–62	95.0
62–68	90.3
68–77	19.5
77–85	6.9

THE UNIVERSITY OF TEXAS
BUREAU OF ECONOMIC GEOLOGY

TEXAS
STONEWALL QUADRANGLE



EXPLANATION

SEDIMENTARY ROCKS

QUATERNARY

Qal — **Alluvium**
(gravel, sand, and silt along stream bottoms)

Qhg — **High gravel**
(gravel and sand in terraces along streams and as colluvial deposits in part changed to caliche on slopes)

UNCONFORMITY

CRETACEOUS

Lower Cretaceous — *Comanche series*

Ked — **Edwards limestone**
(well bedded, in part cherty, in part magnesian; varies widely in composition, hardness, and thickness of beds)

Kcp — **Comanche Peak limestone**
(marl and marly limestone ranging from nodular at base to well bedded at top)

Kwa — **Walnut clay**
(calcareous clay grading upward into the marl of the overlying member; contains a profusion of Exogyra texana)

Shingle Hills formation

Kshgr — **Glen Rose limestone member**
(alternating beds of limestone, marl, and clay, some of which are highly arenaceous)

Kshh / Kshh(c) — **Hensell sand member**
(sand, silt, and clay, predominantly red and gray, with conglomerate, Kshh(c), at base)

UNCONFORMITY

ORDOVICIAN

Lower Ordovician — *Ellenburger group*

Tanyard formation

Oq(mg) — **Gorman formation**
(dolomitic facies, thickly to thinly bedded, predominantly microgranular to fine grained)

Ots(mg) — **Staendebach member**
(dolomitic facies, thickly to thinly bedded, cherty, fine to medium grained)

DISCONFORMITY

CAMBRIAN

Upper Cambrian

Wilberns formation

Cwp(f) / Cwp(c) — **Pedernales dolomite member**
(showing sparingly to abundantly cherty, thinly to thickly bedded, fine grained facies, Cwp(f), and predominantly noncherty, massive, coarse grained facies, Cwp(c))

Cws — **San Saba limestone member**
(sublithographic, thickly bedded, light gray)

Cwpp — **Point Peak shale member**
(thickly bedded to fissile, argillaceous, in part magnesian limestone and massive, sublithographic, greenish gray, stromatolitic bioherms)

Cwm — **Morgan Creek limestone member**
(granular, glauconitic, thinly to thickly bedded, gray in upper part ranging to red at base)

Cww — **Welge sandstone member**
(sparingly to nonglauconitic, brown, massive, scarp forming)

DISCONFORMITY

Riley formation

Crl — **Lion Mountain sandstone member**
(highly glauconitic sandstone with limestone beds and lenses more abundant toward base, bench forming)

Crc — **Cap Mountain limestone member**
(granular, glauconitic, gray to brown; grades to calcareous sandstone at base)

D / U — **Known fault**
(U, upthrown side; D, downthrown side)

Observed and inferred contact

Laterally gradational contact
(diagrammatic)

5° — **Strike and dip of beds**

Prevailing dip of beds

+ 5-20B — **Locality of fossil collection**

F — **Fossils noted but not collected**

Tank
(earth-dammed pond for water storage)

× 1499 — **Alidade elevation of gravity station**

>>>>> — **Line of described section**

Base from U. S. Department of Agriculture, Agricultural Adjustment Administration, aerial photographs flown by Kargl Aerial Surveys, Ltd., 1938.

Geology by Virgil E. Barnes 1939–1947
Assisted by Louis Dixon
Cartography by Ann Connor and J. W. Macon

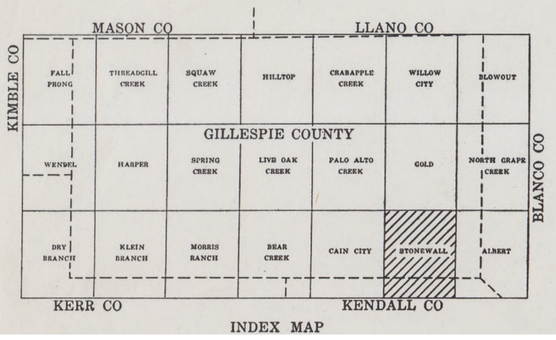
Scale 1 / 31,680

1 ½ 0 1 Mile

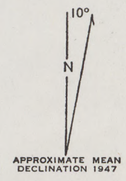
5000 2500 0 5000 Feet

1 ½ 0 1 Kilometer

Datum is mean sea level



INDEX MAP



APPROXIMATE MEAN DECLINATION 1947

GEOLOGIC MAP OF THE STONEWALL QUADRANGLE, GILLESPIE AND KENDALL COUNTIES, TEXAS